ABSTRACT OF THE DISCLOSURE

A millimeter wave imaging system that includes at least one millimeter wave frequency scanning antenna for collecting frequency dependent beams of millimeter wave radiation from a narrow one-dimensional field of view. The collected radiation is amplified at the collected frequencies and the amplified signals are separated into frequency dependent bins with a tapped-delay beam-former. These bins are then sampled to produce a one-dimensional image of the antenna field of view. A two dimensional image of a target may be obtained by moving the target across the field of view of the scanning antenna. In a preferred embodiment the antenna is only 4.5 inches in length and constructed from WR-10 waveguide with inclined slots cut in one of the narrow walls at 79 mil spacings. This geometry creates a frequency-scanned antenna spanning a 20 degree vertical field of view over a 75.5-93.5 GHz operational band of the sensor, starting at approximately 1 degree below horizontal at 93.5 GHz and ranging to approximately 21 degrees below horizontal at 75.5 GHz. In this embodiment 64 of these antenna elements are arranged in four stacks of 16 antennas focused at about 18 inches to construct a portal contraband screener. In another preferred embodiment called the single stick imager, the antenna is 24 inches long with 300 inclined slots serving as receive apertures.